

CHAPTER II: OHIO RIVER NAVIGATION, 1783-1824

No history of the activities of the Corps of Engineers in the Ohio River Valley could be complete without a review of the historic development of waterways navigation and waterborne commerce in the valley, for the major continuing mission of the Louisville Engineer District and its predecessors has been the improvement of waterways as a benefit to navigation. Congress first assigned the improvement of inland rivers to the Corps in 1824, but officers of the Corps, during the performance of their military missions in the Ohio Valley, often reported the condition of the unimproved waterways and described the character of the waterborne commerce prior to 1824. And one of them, Major Stephen H. Long, made significant contributions to the design of the western inland river steamboat. Before recounting the history of the improvement of the Ohio River for navigation, a review of the development of navigation on the Ohio River prior to 1824 is in order.

Condition of the Ohio River Prior to Improvement

Early descriptions of the Ohio River emphasized its navigability, often stating that no serious problems were met in traveling the river except at the Falls. It was, however, not quite as simple as described, for early navigators used light-draft canoes, dugouts, skiffs, and bateaux and did not consider grounding on a bar a serious mishap. Navigators of a later period, who used deeper-draft vessels, were to continually complain of shallow channels, shifting bars, hazardous rocks and snags, and similar obstructions. As the Ohio Valley was settled and extensive use of the rivers for marketing agricultural produce and manufactured goods de-

veloped, obstructions to navigation, because of resultant delays and losses of boats and their cargoes, became more objectionable.

The navigability of Ohio Valley waterways, before 1824 the principal outlet to market, was a matter of great personal concern to the early settlers. In its natural condition, the Ohio River had a constantly changing channel. Annual floods shifted the location of sand and gravel bars, created and destroyed islands, cut new channels and filled old, undermined banks and toppled entire trees into the stream. The river was alternately calm and tumultuous, wildly fluctuating from one foot deep at extreme low water up to eighty feet at record flood stages. In 1838 the entire flow of the river just below Pittsburgh was measured at 1400 cubic feet per second (cfs); at the crest of the 1937 flood about 900,000 cfs poured past Cincinnati into Louisville. From its head at Pittsburgh to its mouth at Cairo, the Ohio ran down a slope with a total fall of 429.4 feet, but the fall was not uniformly distributed. Long pools with a negligible fall alternated with "riffles," or rapids, where the gradient was steep; more than twenty feet at the worst place — the Falls of the Ohio. The natural condition of the tributaries of the Ohio River was generally no better, if not worse, for navigation than that of the Ohio, and traffic originating on tributary streams ordinarily used a portion of the Ohio on its way to port cities and markets.¹

Though a water stage of a mere three feet was considered navigable by early rivermen, this depth was not available on the Ohio for several months each year. Low-water stages usually prevailed in the Ohio Basin from July through October;

during that season only the shallowest-draft vessels operated, and they often were delayed by teams and wagons fording the river at many points. Until railroads crisscrossed the region in the mid-nineteenth century, business practically came to a halt during low-water seasons, manufacturers laid off their employees, and a mini-recession set in, lasting until the river rose. Rivermen and shippers came to rely on two rises: the fall rise which occurred in late October or November, and, after an interval of severe weather and ice conditions, the spring rise in February, March, or April. During such stages, the Ohio Valley waterways teemed with vessels transporting commodities to down-river markets, and, later, to up-river ports via keelboat and steamboat.²

Agricultural enterprise has always been seasonal; its success intimately connected with the amount and timing of precipitation. As long as Ohio Valley mercantile and manufacturing concerns relied chiefly upon the unimproved waterways for transportation of raw materials and salable products, their success was also dependent upon the amount and timing of precipitation. If the fall rise was delayed, or did not occur at all as happened in 1819, a transportation crisis developed and economic consequences were serious. The unpredictable Ohio River continually disrupted business affairs and community life as long as alternate commercial routes were unavailable; however, transportation costs via the unimproved waterways as compared with the existing overland facilities were so much lower that the unreliable channels of the Ohio River and its tributaries were used almost exclusively by commerce until about 1850.³

Flatboats and the Great Immigration

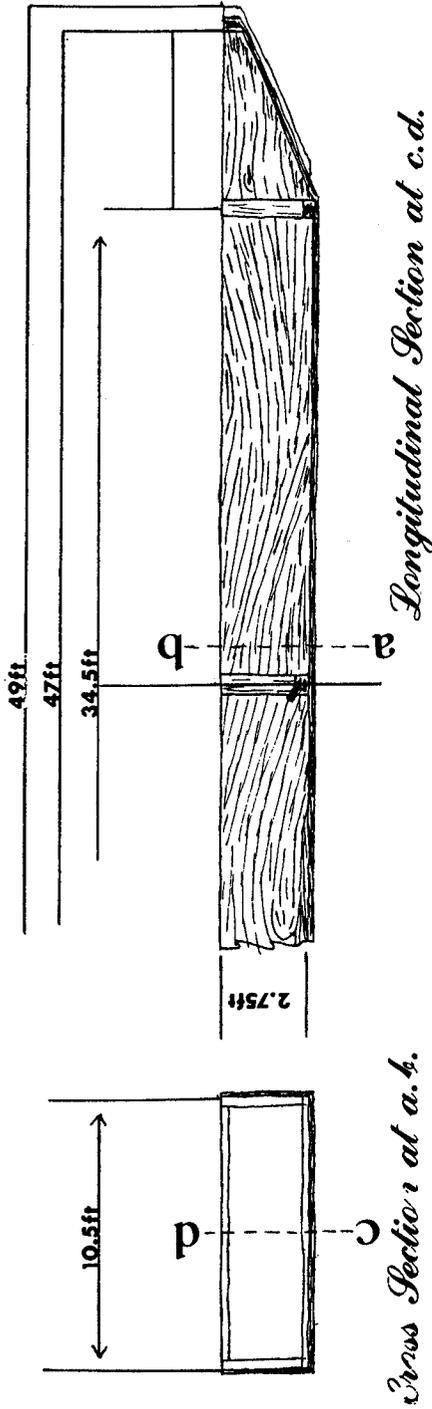
The Ohio River flatboat, originally

merely a large sturdily-constructed wooden box, has been well described as the "ark of empire." Major Jonathan Williams, Corps of Engineers, traveled in them down the Ohio in 1801 and described them as resembling a "floating house." In 1802 another traveler described them more fully:

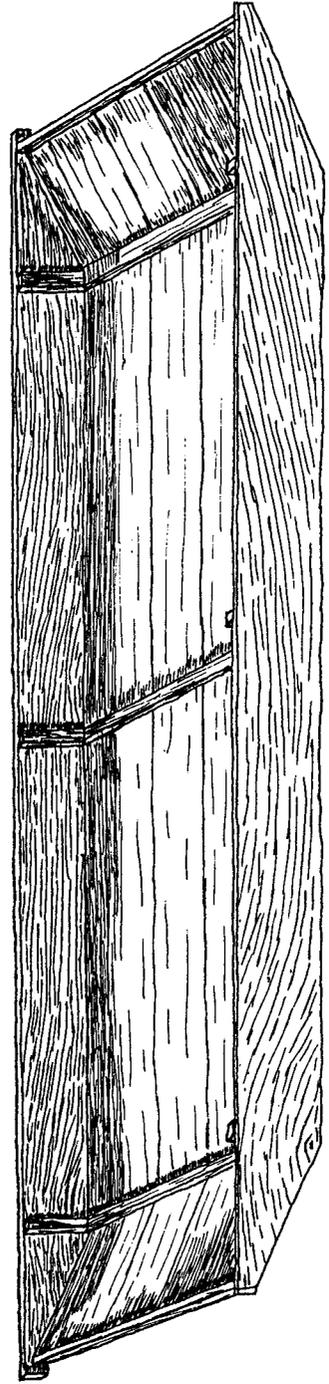
They are of a square form, some longer than others; their sides are raised four feet and a half above water; their length is from fifteen to fifty feet; the two extremities are square, upon one of which is a kind of awning, under which the passengers shelter themselves when it rains.⁴

The flatboat was first used on the Ohio River before the end of the Revolution, and during the decade after the Revolution it became the favorite vessel of the immigrants. Pioneers crossed the mountains to the Upper Ohio Valley and purchased or built flatboats to continue the journey to their new homesteads. The watercraft used by the Indians were too unstable and limited in capacity to transport a family and their possessions; the ribbed and planked bateau of the French was relatively complex of construction; hence, the flatboat was evolved to meet the need for a large, stable vessel of simple construction. In addition to economic transportation, flatboats were also useful at the end of the voyage, for their lumber could be used in constructing new homes. The business of constructing these vessels for sale to the tide of immigrants reached major proportions in the Upper Ohio Valley in the late eighteenth century. Two to three hundred families annually embarked on the Monongahela at Brownsville for the down river trip, and there is record of 1200 immigrants boarding flatboats at Olean, New York, after the ice broke in 1815 to descend the Allegheny and Ohio rivers to new homes in the Lower Ohio Basin. In 1788, the peak

**FLATBOAT
USED FOR BOATING COAL
ON
ELK FORK of LICKING RIVER.**



Isometrical View



year of the great immigration, at least 308 flatboats, transporting over 6,000 immigrants, about 3,000 head of livestock, and 150 wagons passed down the Ohio on the spring rise.⁵

Flatboats depended on the current for motive power, and there was no turning back once embarked, for upstream navigation in such unwieldy craft required efforts which almost exceeded human capability. They were steered with long oars, or sweeps, but keeping in the unimproved, constantly changing river channel was quite a challenge. Boats often grounded on bars, wrecked on projecting rocks, or were pierced by snags, and in the early days of the traffic the threat of Indian attack was always present. Captain William Tell Poussin, a Frenchman who became an officer in the United States Topographical Engineers, traveled the Ohio River in flatboats on various missions before 1825. He later recalled:

In descending the Ohio and the Mississippi . . . it was customary to purchase and freight a flat boat. Embarking on this, it was necessary to trust to the strength of the current to convey you to your destination. This was certainly not a very expeditious method of traveling, especially when your only resource besides the current was the occasional use of the oar or the sail. From sixty to seventy days were consumed in this part of the journey; and it was not without exposure to difficulties and perils of no ordinary kind that so protracted a journey could be performed in the midst of the numerous Indians who, allured by the hope of booty, at that time frequented the shores of these rivers.

We arrived at New Orleans (from Pittsburgh in 1817), after this manner, in about eighty-four days, at an expense of from one hundred and twenty to one hundred and forty dollars; and the traveler who reached his destination with no other inconveniences than that inseparable from so hazardous an undertaking was considered exceedingly fortunate.⁶

Flatboats and Commerce

The exportation of commodities from

the Ohio Valley to New Orleans via the waterways began before the Revolution. As early as 1763, eighty thousand dollars worth of animal skins and tallow valued at four thousand dollars arrived at New Orleans from up river, and part doubtless came from the Ohio Valley where French and Spanish hunters were operating. It will be recalled that Baynton, Wharton, and Morgan of Philadelphia entered the Indian trade and army supply business on the Ohio in 1765; other similar mercantile firms were also active at about the same time. During the course of the Revolution there was also some limited traffic, both up and down the Ohio, in munitions and military supplies for the forces commanded by George Rogers Clark and other military units in the Ohio Valley.⁷

Jacob Yoder of Pennsylvania, and later Spencer County, Kentucky, has been credited with performing the first flatboat trip down the Ohio and Mississippi to sell agricultural produce at New Orleans in May, 1782. This may be true, but there exists fuller evidence for the trip of the Tardiveau brothers. At the encouragement of Benjamin Franklin and perhaps Jonathan Williams, Barthélemi and Pierre Tardiveau moved from France to Philadelphia in 1777 to establish a mercantile firm in partnership with Jean Holker, the first French Consul to the United States. In 1781 Tardiveau and Holker furnished supplies in the Ohio Valley for George Rogers Clark and the Virginia regiments, and in 1782 the firm sent a fleet of boats laden with flour and other merchandise from Fort Pitt to New Orleans; but they lost their investment when "pirates," a band of Loyalists and Indians led by James Colbert, seized the boats before they reached New Orleans.⁸

In 1783, Barthélemi Tardiveau conducted what might be called the first "in-

dustrial survey" of the Ohio Valley to explore the possibilities of establishing a regular trade from Kentucky to New Orleans. He addressed a questionnaire about business prospects to several leaders of the Kentucky settlements. Walker Daniel, the first Attorney General for the District of Kentucky, responded that a profitable trade could probably be had by constructing boats which could be sold along with their cargoes at New Orleans. Captain John May, the frontiersman for whom Maysville, Kentucky, is named, replied that Kentucky "hitherto had no commercial intercourse with any country whatever" and was in great need of merchants and trading facilities.⁹

Captain May believed that when hostilities with the Indians ended, the commerce of Kentucky would be great; salable commodities would include tobacco, flax, meat and animal products, grain, flour, and hemp. He listed a number of minerals which might be mined and manufactured, and mentioned that he had discovered a spring from which a substance resembling tar (petroleum) emanated. Captain May recognized the waterways route to New Orleans was longer than other possible trading routes, but explained: "it is not the distance, but the having water carriage that makes the expence of transportation light." The frontiersman also expressed an interesting opinion about the future of Louisville:

As the Falls of Ohio is the place where all vessels both coming up, and going down the river, must call to unload, when it is not very high; and as this place has a large extent of fertile country to support it; larger and richer than any other place in the united states [*sic*], I am of opinion it will be one of the greatest trading towns in America: Loaded boats can at all times pass up and down the river both above and below the Falls, but as it is only at certain periods that they can pass through, I am inclined to think that the vessels

intended for the navigation of the river above that place will be kept above altogether; that they will unload there, take in other cargoes, and return to the places from whence they sailed, without going below, and that other vessels will bring our goods to the Falls.¹⁰

Captain May's opinion about the future of the Falls of the Ohio area may have had some influence on the firm of Tardiveau and Holker, for it purchased large quantities of land on the Indiana bank of the Falls from soldiers of the Clark expedition. The firm also invested in lands (in present Gallatin County, Illinois) on the Saline River, a tributary of the Ohio, and established a salt-producing business.¹¹

A major obstacle to the trade with New Orleans was the possession of the port by Spain, which made the Ohio-Mississippi trade dependent upon the diplomatic relations between Spain and the United States. Trade with New Orleans was closed for a time in the mid-1780s, and was reopened by James Wilkinson, later a General of the United States Army and always a controversial figure on the American frontier. Wilkinson took a cargo of Kentucky produce to New Orleans in 1787 and negotiated the privilege of making further sales at that market. In 1788 he dispatched a fleet of twenty-five boats loaded chiefly with tobacco and flour from Kentucky to New Orleans.¹²

Spanish authorities opened the trade to other individuals; and after 1795 the flat-boat trade reached major proportions. In 1798 goods valued at near a million dollars arrived at the "Crescent City" from the Ohio Valley. After the Louisiana Purchase of 1803, which secured American control of the port, the trade greatly expanded and in 1807 about 2,000 boats arrived at New Orleans from up river, bearing commodities valued at more than five million dollars. The variety of the articles sent

south from the Ohio Valley was indicated by the lading of 197 flatboats and 14 other vessels which descended the Falls of the Ohio in a two month period in the winter of 1810-1811. They carried pork, flour, whiskey, apples, cider, wines, brandies, vegetables, beef, cheese, rope and bagging, chickens, horses, lumber, slaves, pottery, iron manufactures, cabinetwork, and leather goods.¹³

Effect of Flatboat Trade at Louisville

As Captain John May predicted in 1783, the necessity for boats to land and hire a pilot or portage freight around the Falls of the Ohio made Louisville a mercantile center at an early date. The settlement at the Falls of the Ohio was founded during the Revolution by George Rogers Clark, a detachment of troops, and a handful of families, who descended the Ohio in flatboats. At the present site of Louisville and on an island at the Falls, Clark established a settlement and constructed a fort; the forerunners, it has been said, of Jeffersonville Quartermaster Depot and Fort Knox. Clark and his troops then proceeded down the Ohio to complete one of the most successful military expeditions in American history, capturing British posts in the Old Northwest in spite of floods, supply shortages, and the numerical superiority of the enemy's forces.¹⁴

The Falls of the Ohio and the natural harbor formed by the juncture of Beargrass Creek with the Ohio just above the Falls made Louisville a natural mercantile city. Scores of teamsters operated drays to move cargoes around the Falls, and a number of pilots made their livelihood by guiding boats across the Falls. The Dominion of Virginia established a customs collection station at Louisville in 1784; and one of the first acts of Congress was to make Louisville a port of entry for

the collections of customs duties in 1789. Other ports of entry established in the lower Ohio River Basin before 1800 included Palmyra, Tennessee, on the Cumberland River in 1797, and Cincinnati, Ohio, and Fort Massac, Illinois, in 1799.¹⁵ Waterways commerce was the single most important factor in the economic development of Louisville until about 1820 when manufacturing began its extensive development in the area; waterborne commerce was to remain an important element of the Falls City's economic structure throughout the nineteenth and twentieth centuries.

Shipbuilding

Ports of entry for the collection of duties on foreign trade were required in the Ohio Valley because New Orleans was in the possession of foreign nations until 1803. In addition, a number of full-rigged, sea-going sailing vessels were constructed at Ohio River ports in the last decade of the eighteenth century, freighted with Ohio Valley produce, and sent down the rivers to enter trade with the West Indies, Europe, and even to ports on the Mediterranean. Sailing ships were constructed at Pittsburgh, Marietta, Cincinnati, Louisville, and other inland ports in surprising numbers.¹⁶

One of the leading shipbuilding firms was founded at Pittsburgh in 1801 by Louis and John Tarascon and James Berthold. The Tarascons immigrated from France to the United States in 1794 and entered the importing and mercantile business at Philadelphia. In 1799, two clerks employed by the Tarascons, Charles Brugiere and James Berthold, navigated the Ohio and Mississippi rivers to survey the commercial prospects. After they made favorable report, the firm of John A. Tarascon, Brothers, James Berth-

old & Company was established at Pittsburgh and constructed a wholesale and retail store and warehouse, a shipyard, a rigging and sail loft, an anchor-smith shop, and all facilities necessary to build and equip sailing vessels. The company built and dispatched at least five brigs, schooners, and ships down the Ohio and Mississippi between 1802 and 1804. After entering the Gulf of Mexico, the vessels usually made Philadelphia their home port and entered foreign trade to ports as far away as Trieste, Italy.¹⁷

The company met with serious difficulties in getting its large vessels past the Falls of Ohio, and about 1806 relocated the business just below the Falls at Shippingport. But not long thereafter the shipping business was disrupted by the Embargo Act and the War of 1812; doubtless the advent of the steamboat on the Ohio in 1811 also made the enterprise less financially attractive. Shipbuilding was revived on the Ohio, however, in the 1840s, notably at Marietta, Ohio, and as late as 1865, a sea-going vessel, the *Mary Belle Roberts*, passed the Falls of Ohio on its way to foreign ports. Like the flatboat trade, ships constructed on the Ohio went down river and did not attempt the return. It appears that most did not raise their sails until the end of the voyage on the inland rivers.¹⁸

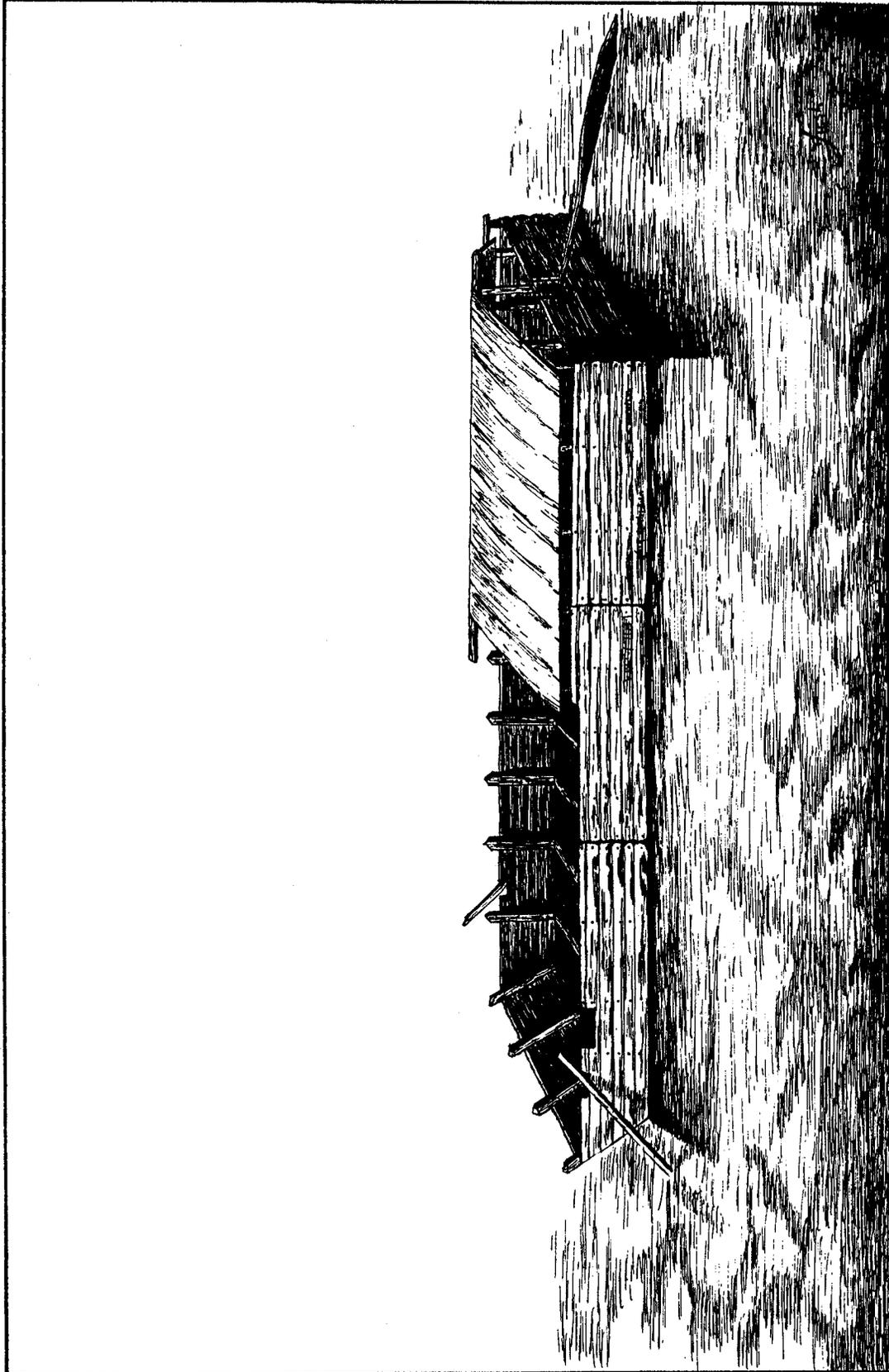
Keelboat Commerce

The problem of exporting Ohio Valley produce to market was solved by the flatboat, but importing goods was a more complex problem. Because transporting goods over the mountains from Atlantic ports by pack horse and wagon was quite expensive, the settlers of the Ohio Valley looked to the waterways as an economical alternative. Canoes, dugouts, and bateaux were used extensively for upstream

navigation in the earliest days of settlement, but they had limitations of cargo capacity which precluded their profitable utilization for long distances. Efforts were made to place flatboats in the upstream trade, but their box-like construction made the process so difficult and time-consuming that the cost was prohibitive. The first pioneer solution to the problem were the more maneuverable and greater capacity keelboats and barges.¹⁹

Keelboats and barges evolved from improvements in the construction of the bateau. The "keel" was the rigid longitudinal timber which bore the brunt of collisions, and the hull, shaped much like that of a sailing ship, was constructed of ribs covered with planking. The dimensions of keelboats varied from thirty to seventy-five feet in length and from five to ten feet wide, with a cargo capacity of from fifteen to forty tons — barges could be much larger. One keelboat navigator described the superstructure as "a covered way, a kind of cabin occupying the entire hold of the boat, excepting spaces for small decks at each end, and a strip on each side the whole length of the boat, about fifteen inches wide, called the 'run,' on which the men walked when 'poling' the boat upstream."²⁰

Keelboats carried masts and sails and used them when possible, but the boats were commonly propelled by a crew of men with long, iron-tipped poles. Standing at the prow of the boat, the crew rammed the poles into the streambed, braced them against their shoulders, and walked the boat upstream under their feet. At the stern, they picked up the poles and returned to the prow to repeat the process. Keelboats ordinarily ran close to a bank to avoid swift currents, and this often provided opportunity for "bush-



Sketch of a Flat bottom Boat; such as are used to descend the Ohio and the Mississippi.

VICTOR COLLOT, "A JOURNEY IN NORTH AMERICA IN 1796,"

whacking," or pulling the branches of overhanging trees to drag the boat up river. Where the current was swiftest, keelboatmen resorted to "cordelling" and "warping." The former consisted of putting the crew ashore to pull a rope attached to the bow or mast, and the latter involved tying the rope to an upstream tree and pulling from the deck of the boat.²¹

Like many early developments in Ohio River navigation, the date of the first use of the keelboat is in doubt. General James Wilkinson claimed in 1805 that he had accomplished the first voyage from New Orleans to Kentucky in 1789, but it is not clear that he used a keelboat. He described the vessel only as a "boat of fifteen tons burthen." Wilkinson observed that:

The existing impediments are sufficient to frighten cursory observers, and to condemn the idea of a familiar, convenient and profitable communication from New-Orleans to Louisville by water. A voyage of two thousand miles, with the same boat and crew, against a heavy current, appears sufficient to exhaust the strongest physical force, and to appal the most ardent enterprise; delays and extraordinary expences are inseparable . . .²²

Regular use of keelboats began in the 1790s, and by the time the first steamboat appeared on the Ohio in 1811 over three hundred keelboats were plying the Ohio and its tributaries and they had supplanted much of the over-mountain trade from the East. A keelboat owner reported in 1817 that the cost of operating a boat of thirty-six tons capacity from New Orleans to Louisville was \$1750, including \$75 salary to each member of a fourteen-man crew, subsistence for the crew for seventy-five days at \$525, pay for the steersman — \$75, and boat depreciation — \$100. He grossed \$3240 at a rate of \$90 per ton, which, minus his expenses,

equaled a profit of \$1490 for each trip. His capital investment was \$2,000 or less.²³

The Rugged Rivermen

Navigating the inland rivers in flats and keels was an extremely rough and dangerous business. In addition to the hazards of normal navigation on unimproved rivers, there were, in the earliest days, numerous Indian attacks on passing boats; later, there were the notorious pirates at Cave-in-Rock and the infamous boatwreckers at Fort Massac. Robbers victimized rivermen at all port cities and renegades infested the Natchez Trace, the overland return route to the Ohio Valley from New Orleans.²⁴

The rough life and manners of pioneer boatmen brought them a reputation, apparently well-deserved, for violence and profanity. Travelers were advised that rivermen were "incorrigible scoundrels," and that it would be wise to wear a dagger and a brace of pistols. A traveler on the Ohio in 1817 commented:

There are about two thousand people regularly employed as boatmen on the Ohio, and they are proverbially ferocious and abandoned in their habits, though with many exceptions . . . People who settle along the line of this grand navigation generally possess or acquire similar habits; and thus profligacy of manners seems inseparable from the population on the banks of these great rivers. It is remarked, indeed, everywhere, that inland navigators are worse than sailors.²⁵

Profanity was their native language; violence was a way of life. But pushing and pulling a boat up the Mississippi and Ohio rivers for \$75 a trip was the sort of life which encouraged gentility? The physical exertions required to push loaded boats up such snag-studded streams as the Salt River, which joins the Ohio a few miles below Louisville, were enormous, but it was done. Mike Fink, the Bunyanesque

hero of the keelboatmen, often boasted that he was a "Salt River roarer," and the difficulties encountered in navigating the Salt were imbedded in the English language in the imperishable phrase: "Up Salt Creek with a paddle." But navigating the rivers in the natural condition had its compensations, for those who had the time to appreciate them. John James Audubon, the naturalist, alluded to one of them in his description of a voyage from Louisville to Henderson, Kentucky:

It was in the month of October. The autumnal tints already decorated the shores of that queen of rivers, the Ohio. Every tree was hung with long and flowing festoons of different species of vines, many loaded with clustered fruits of varied brilliancy, their rich bronzed carmine mingling beautifully with the yellow foliage, which now predominated over the yet green leaves reflecting more lively tints from the clear stream than ever landscape painter portrayed or poet imagined.²⁶

Keelboat and flatboat pilots and crews did not lose their employment after the development of the western steamboat; indeed, the business increased for flatboat navigators because they no longer had to walk back to their homes. Keelboats lost the passenger traffic to the steamboats and could no longer compete on the long distance routes, but they found employment on tributary streams above the head of steamboat navigation until roads and railroads facilitated overland travel in those regions. Flatboat traffic did not reach its peak until fiscal year 1846-1847. In that year 2,792 flatboats arrived at New Orleans, and more than 2,200 were from the Ohio Valley. Use of the flatboat dwindled on the Ohio River after the Civil War, but some flatboat traffic continued until the early twentieth century.²⁷

Early Steamboat Navigation on the Ohio

From 1811, when the first steamboat on the Ohio frightened Louisvillians, until 1935, when the last commercially-operated sidewheel packet passed Louisville for the final time, residents of the Falls of Ohio area were participants and witnesses in the greatest development of steam navigation in history. The steamboat was the chief technological innovation in the United States in the early nineteenth century, and it launched a revolution in transportation which transformed the Ohio Valley from an isolated frontier region into a commercially developed and integrated section of the United States. Where keelboats took up to four months to push from New Orleans to Louisville, the first steamboat which made the trip cut the time to less than a month, and steamboats eventually made the run in five days. In addition to contributing to the commercial and industrial development of the Ohio Valley as a whole, the steamboat also was a major factor in the realignment of trade routes within the valley. For example, Louisville at its strategic location at the Falls of Ohio surpassed inland Lexington in population and as a trading center not long after the advent of the steamboat.²⁸

Like most technological advances, the development of the complex mechanism of the steamboat engine, the steamboat propulsion system, and the sophisticated design of the steamboat hull was a lengthy process in which many inventors and engineers participated. Though Robert Fulton has often been credited with the construction and operation of the first successful steamboat in the United States, that claim has been disputed on behalf of a number of other early marine engineers. Three men who resided in Kentucky for at least a portion of

their lives — John Fitch, James Rumsey, and Edward West — invented and constructed steam-powered, mechanically operated vessels, and each has had supporters in the dispute over who invented the steamboat.²⁹

Two Army Engineers, George Washington and Thomas Hutchins, early recognized the potential value of steamboats for river navigation and were interested in the work of John Fitch and James Rumsey. Thomas Hutchins introduced Fitch to the French Consul and brought Fitch's steamboat to the attention of Congress in efforts to obtain financial support for the further development of the invention. George Washington observed the operation of a model of the boat invented by James Rumsey, and wrote in 1784 that Rumsey "has discovered the Art of working boats by Mechanism and small manual assistance against rapid current; that the discovery is of vast importance, may be of the greatest usefulness in our inland navigation" ³⁰

Edward West, who invented a machine for nail production and who has been acclaimed as the "father of the nail industry," demonstrated a model of his steamboat at Lexington, Kentucky, in 1793; but the first full-size steamboat which actually operated in the Ohio Valley was the *New Orleans*. It was constructed at Pittsburgh by Nicholas Roosevelt, who represented the Fulton interests. Roosevelt navigated from Pittsburgh to New Orleans in 1809 to study the rivers, collect commercial information, and arrange fuel supplies. He returned to Pittsburgh, constructed the steamboat *New Orleans*, and departed for New Orleans in October, 1811. The vessel reached Louisville near midnight on October 28, and the roar of escaping steam

brought crowds of Louisvillians to the riverside. Some thought a comet had fallen into the Ohio. But the Falls of Ohio were impassable at the time, and Roosevelt took the *New Orleans* back to Cincinnati where it waited until the end of November when the fall rise began. It returned to Louisville, crossed the Falls successfully, and steamed down river to enter the New Orleans-Natchez trade.³¹

Robert Fulton and his associates planned to operate three separate steamboat routes: New Orleans to Natchez; Natchez to Louisville; and Louisville to Pittsburgh. They also hoped to acquire a monopoly on the steamboat business in the West by acquiring exclusive charters from state governments. Fulton boats were placed in operation on each of the three routes, but the efforts of the company to secure exclusive rights to steam navigation were frustrated by competing firms who constructed their own boats, made free navigation an issue in the courts, and won a decision to the effect that states did not control navigable streams and could not grant exclusive privileges.³²

Captain Shreve and Early Steamboating

One of the rivermen who had a part in breaking the Fulton monopoly and who played a major role in the development of steamboat navigation on the Ohio and other inland rivers was Captain Henry Miller Shreve. Captain Shreve, whose home was Shippingport just below the Falls of the Ohio, began his career as a keelboatman; from 1813 to 1826 he was the foremost steamboat captain on the inland rivers, and from 1826 to 1841 he served as Superintendent of Western River Improvements for the Corps of Engineers. Henry McMurtrie, an early his-

torian of Louisville, wrote of Shreve in 1819: "It is to his exertions, his example, and let me add, to his integrity and patriotic purity of principle, that it [Louisville] is indebted for the present flourishing state of its navigation."³³

In 1814 Captain Shreve piloted the steamboat *Enterprize*, with a cargo of munitions, from Pittsburgh to New Orleans, arriving in time to participate in the Battle of New Orleans. He brought the *Enterprize* back to Louisville in 1815 — the first ever to make the upstream trip. The Fulton interests brought suit against the *Enterprize* and its owners for violating the exclusive privilege granted to the Fulton company by Louisiana, and it was reported that Captain Shreve was offered an interest in the Fulton company if he would deliberately lose the case but Shreve preemptorily refused the offer. In 1816 Shreve and his associates constructed the steamboat *Washington*, with an engine and machinery modified by Captain Shreve to reflect the results of his experience. The cylinder of the Shreve engine was nearly horizontal and was connected with the paddlewheel by a pitman. With few exceptions, the system used on the *Washington* was the basic design for western steamboats thereafter.³⁴

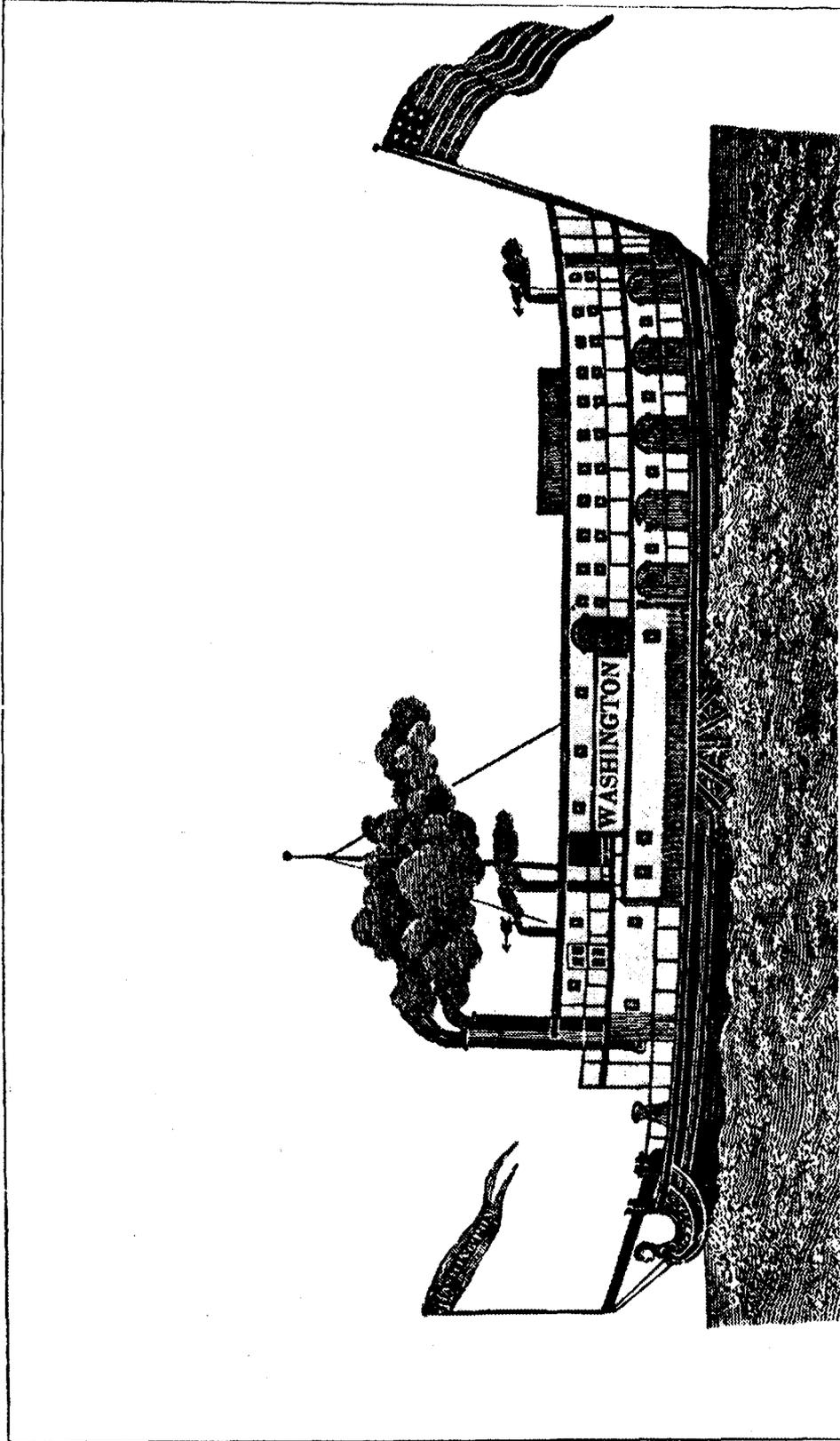
The maiden voyage of the *Washington* was not auspicious, however. It blew a cylinder head, or perhaps a boiler, near Maysville, Kentucky, killing thirteen of the crew. After repairs, the boat continued its voyage only to lodge on a bar above Louisville and spend the entire summer of 1816 waiting for a rise. Captain Shreve persevered, completed the trip to New Orleans, and subsequently made several highly profitable voyages in the *Washington* which engendered great interest in the potential of steamboat navigation.³⁵

Major Long and the Western Engineer

Further advances in steamboat construction were engineered by Major Stephen H. Long, Topographical Engineers, in 1819. Major Long, a Dartmouth graduate who had joined the Corps during the War of 1812, traveled the Ohio River in a skiff in 1816. In 1818 he was directed by Secretary of War John C. Calhoun to lead a combined military reconnaissance and scientific expedition, in conjunction with troops ordered to the frontier, down the Ohio and up the Mississippi and Missouri rivers. Of the four steamboats constructed for the expedition, three were built on the Kentucky River by James Johnson, an army contractor, and the fourth by Major Long at Pittsburgh.³⁶

Major Long made several novel modifications in the design of the steamboat, which he named the *Western Engineer*. He invented and applied the cam cutoff, a device which permitted a more economical utilization of available steam. Because he expected to navigate narrow and shallow rivers, he designed the hull and distributed the machinery in such a manner that draft of the boat was nineteen inches. The *Western Engineer* was seventy-five feet long and thirteen-feet abeam; the narrow width made possible by locating the paddlewheel at the stern of the boat, rather than at the usual position amidship. These modifications were significant contributions to the development of the western river steamboat.³⁷

There were a number of other unusual features in the design of the *Western Engineer* and its equipment. Major Long expected to encounter hostile Indian tribes during the expedition, and the boat was well armed to meet such a contingency; in addition, the vessel was de-



THE "WASHINGTON," BUILT 1820, AT CINCINNATI BY
GENERAL PAUL ANDERSON AND OTHERS

From an early woodcut in the possession of Frederick Way, Jr. Features:
Bob tail, crude paddle wheels, and absence of pilot house.

signed to win the awe and friendship of the natives. It flew a flag painted by Titian Ramsey Peale, a noted artist who accompanied the expedition, which represented a white man and an Indian shaking hands, bordered by a peace calumet and a sword. The engine and propulsion apparatus were completely concealed, and a steam-escape pipe was installed to emit smoke and steam through the head of a serpent, with a red, forked tongue, which projected from the bow. Thus, the *Western Engineer* might give the appearance to a native of a monstrous, black, fire-breathing serpent, which lashed the water to a foam with its tail.³⁸

Major Long launched the *Western Engineer* at Pittsburgh in the spring of 1819. It had a six-man crew, and nine enlisted men of the Corps of Artillery were also aboard to service the guns if necessary. Because it was a scientific mission, Major Long recruited several outstanding scientists and naturalists, including Dr. Edwin James, Titian Ramsey Peale, and Thomas Say, and he had two military assistants — Captain John R. Bell, Corps of Artillery, and Lieutenant William H. Swift, Topographical Engineers. The *Western Engineer* embarked from Pittsburgh, in company with ten keelboats carrying the Sixth United States Infantry, and arrived at Louisville on May 19, successfully crossing the Falls on May 20. At Shawneetown, near the mouth of the Wabash, Major Long made further modifications in the vessel, then proceeded to St. Louis and up the Missouri River.³⁹

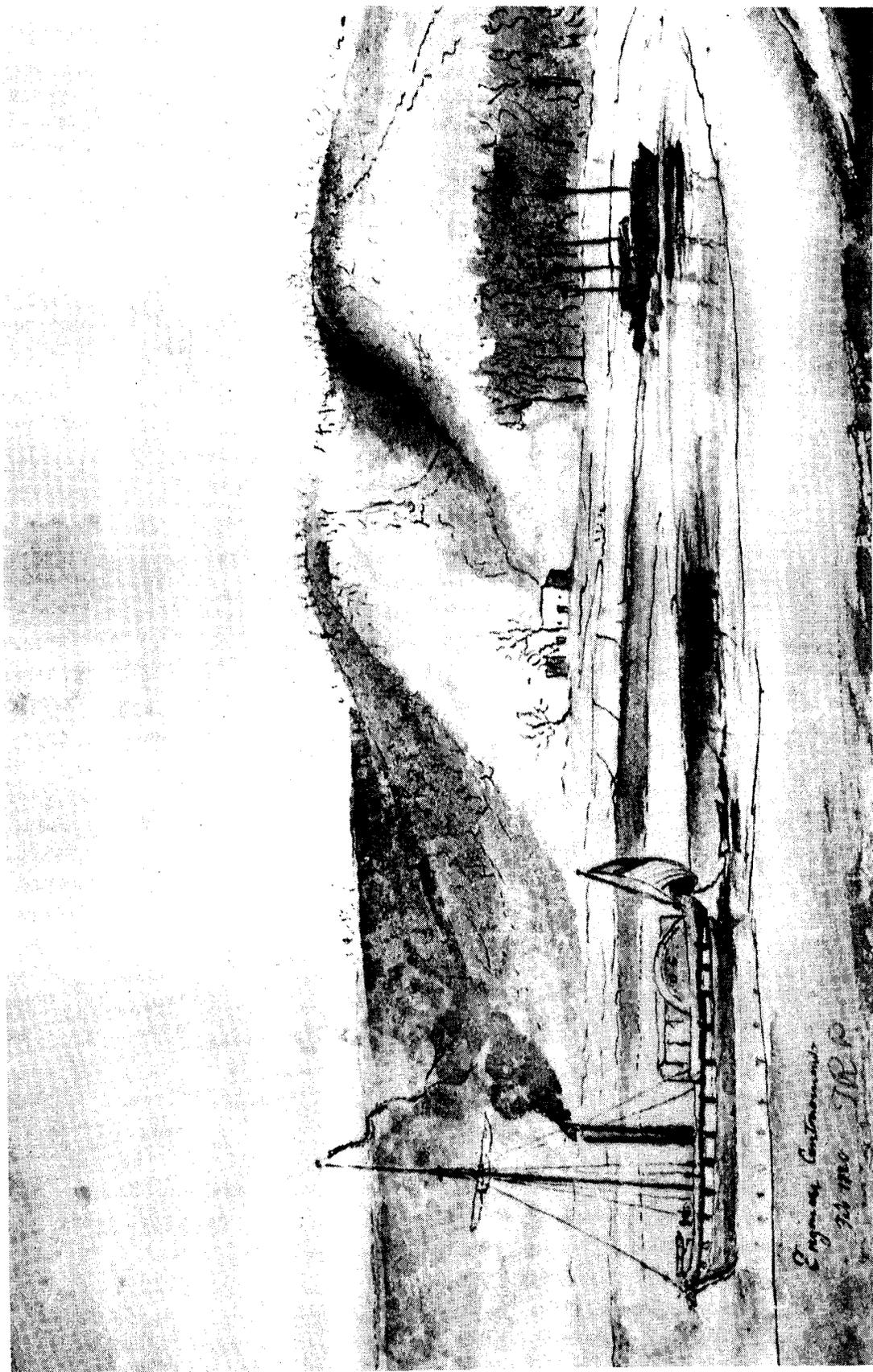
Accounts of the Long expedition of 1819 usually emphasize its consequences in the opening of the West to settlement and its contributions to topographic and scientific knowledge about the Missouri Valley frontier, for the *Western Engineer* was only the second steamboat to navigate the

Missouri and it went much farther up river than had the first. But, though the Ohio Valley was already settled, the Long expedition conducted scientific studies of fossil remains, minerals and vegetation, agricultural and timber resources, and waterways navigation during the voyage down the Ohio. Major Long personally reported on the navigation problems of the Ohio. He wrote:

The obstructions to its navigation are sand-bars, some few rafts, snags and rapids, to which the intricacy [*sic*] of its channel in several places, may be added. During a middle and high stage of water the obstructions entirely disappear, and an accelerated current is the only difficulty to be encountered. The average velocity of the current in a moderate stage of water may be estimated at 2½ miles, and in a high stage at 3 miles per hour. The season in which the navigation of the Ohio can be relied on commences between the middle of February and the first of March, and continues to the latter part of June. A Fall freshet usually takes place in October or November and the river is again navigable for a few weeks.

During the rest of the year boats of inconsiderable burden meet with numerous obstructions, in their progress, from the lowness of the water, and in many places no channel can be found of sufficient depth to admit their passage. At the distance of about 17 miles from its mouth, is the first serious obstruction to its navigation, consisting of a limestone bar extending across the river, denominated the Big [Grand] Chain. Three miles above it is another bar of similar description [Little Chain] The falls of the Ohio at Louisville are impassable for boats of burthen, except in the higher stages of the water. Le Tarts Falls and numerous other rapids denominated Ripples, are also impassable for boats of any considerable burthen, when the river is at its lowest stages. In this state the river is fordable in numerous places.⁴⁰

On his return from the exploration to the Rocky Mountains, Major Long planned to navigate up the Ohio River in the *Western Engineer*, but he found the Ohio too low for even a boat of nineteen-inches draft. During late 1819 and early 1820, there



(Painting by T. R. Peale, American Philo. Society Library, Philadelphia, Pennsylvania)

The U. S. Western Engineer, constructed by Major Stephen H. Long at Pittsburgh, 1818-1819. Used by Major Long for Yellowstone expedition 1819-1820 and by Corps of Engineers (Board of Internal Improvements) in survey of Lower Ohio and Mississippi in 1821.

was no fall or winter rise and the Ohio River was at its lowest water stage for a longer period than at any other time prior to the Civil War.⁴¹ This lengthy low-water season had such drastic effects on community and economic life in the Ohio Valley that state governments and Congress initiated a program to improve navigation on the Ohio. The report Major Long made on the navigation problems of the Ohio in 1819 doubtless influenced his selection by the Chief of Engineers in 1824 to supervise experiments with methods of improving navigation.

Louisville and the Steamboat Boom

Steamboats reduced transportation costs by as much as eighty percent on the Ohio River, and at those low rates their operation was still profitable. Keelboat rates from New Orleans to Louisville before 1820 were commonly \$5 per hundred pounds; in 1820 steamboats on the same run were transporting freight for \$1 per hundred pounds. Steamboat navigation up the Falls of Ohio was usually impossible for ten or more months of the year; boats landed at Shippingport and their cargo was hauled to a point above the Falls and reshipped. Steamboat freight from the upper Ohio Valley was also hauled around the Falls, except at the higher water stages; thus, the Falls severed Ohio River navigation in twain and made Louisville a major river terminal.⁴²

In 1806 six keelboats and two barges carried the entire trade of Louisville, but by 1819 there were, in addition to keelboats, about twenty-five steamboats with an aggregate cargo capacity of 6,500 tons running to and from Louisville. A minister who floated down the Ohio in a flatboat in 1816 and returned on a steamboat in 1826 commented during the latter voyage:

I had remarked, as soon as we began to pass the highlands on the Ohio, the wonderful change, which ten years had wrought in that region. The log-houses were gone, and replaced by houses of brick. The orchards, which were just planted when I descended the Ohio, had become thrifty trees of considerable size, and were now white with blossoms. Passing steam-boats, thriving villages, bustle and business had taken the place of the solitude and stillness of the same places at the former period. Louisville had grown to be a fine town. The ware-houses, the stores, the smell at the landing even, the ship-yards, all indicated the mercantile character, the great and growing importance of the place.⁴³

Steamboat construction and supply became a major industry at the Falls of the Ohio. An iron foundry and steam engine factory located at Louisville in 1817, and produced its first ten steam engines in 1818. Between 1820 and 1880 almost 6,000 steamboats were constructed in the Ohio and Mississippi valleys; 32 percent were constructed near Pittsburgh; 26 percent at Cincinnati; and 23 percent in the Louisville area. Other steamboat construction centers on the Lower Ohio included Madison, Jeffersonville, New Albany, and Evansville, Indiana, and Smithland and Paducah, Kentucky. Other industries also located in the Ohio Valley to take advantage of low transportation costs; for example, the Hope Distillery Company relocated in 1816 from New England to Louisville, where it could draw the grain trade of the Ohio, Kentucky, Scioto, and Miami river basins.⁴⁴

The unique splendor and power of the western river steamboat somehow represented the aggressive Western spirit. Perhaps Captain William Tell Poussin, Topographical Engineers, best described this relationship:

Nothing exhibits in so significant a manner the extent to which steam navigation is identified with the active genius of the people of the West, as the daily motion of the floating ark, known as the

steamboat of the West, which is three-decked and not infrequently carries twelve hundred passengers.....

The traveler, starting from Louisville, Kentucky, can arrive at New Orleans, a distance of nearly seventeen hundred miles, in three days. The ascending trip can be performed in from five to seven days. The rapidity of this traveling is somewhat startling. This is especially the case when two steamboats, coming in opposite directions, are seen to pass each other. A stranger cannot witness this scene without feeling of apprehension. But the cool and tranquil American, confiding in the skill of the helmsman, contemplates with interest and a species of vanity these two smoking points, which are scarcely in sight before they are far away in contrary directions. They indicate his genius and his power!⁴⁵

Summary

From canoes and dugouts to gaudy steamboat palaces, navigation on the waterways of the Ohio Valley underwent a major metamorphosis between 1783 and 1824. The serviceable Indian watercraft were used on the frontier, but their lack of capacity and stability precluded their effective use for the transportation of the pioneers and their produce down the waterways. The flatboat admirably met the needs of the pioneers for economical transportation and its use continued until the twentieth century. But the flatboat was too cumbersome for efficient use in upstream navigation, so pioneer rivermen developed and adopted the keelboat for use in the import trade. The low-cost

transportation provided by the steamboat was revolutionary in effect: the volume of waterborne commerce on Ohio Valley waterways rapidly increased; transportation became a specialized business separate from agricultural and retailing pursuits; and the frontier subsistence economy of the Ohio Valley was transformed into a thriving, commercial structure.

The contributions of Army Engineers to these developments in navigation were not major; neither were they insignificant. The numerous guides printed for the use of immigrants and rivermen were based on maps originally prepared by Army Engineers. Officers and men of the Army Engineers were on the frontiers exploring, mapping, studying resources, reporting on navigation, constructing fortifications, and joining in the fight to protect the pioneers from Indian and foreign threats. Steamboat engineering benefited immensely from the work of Captain Henry Shreve and Major Stephen Long; the experience of these men in river navigation prior to 1824 was later called upon by the Corps of Engineers as part of its program to improve waterways navigation. By 1824, the amount of waterborne commerce on the Ohio and Mississippi rivers was so great, the population it served so large, and the need for navigation improvement so apparent, that federal action was initiated.